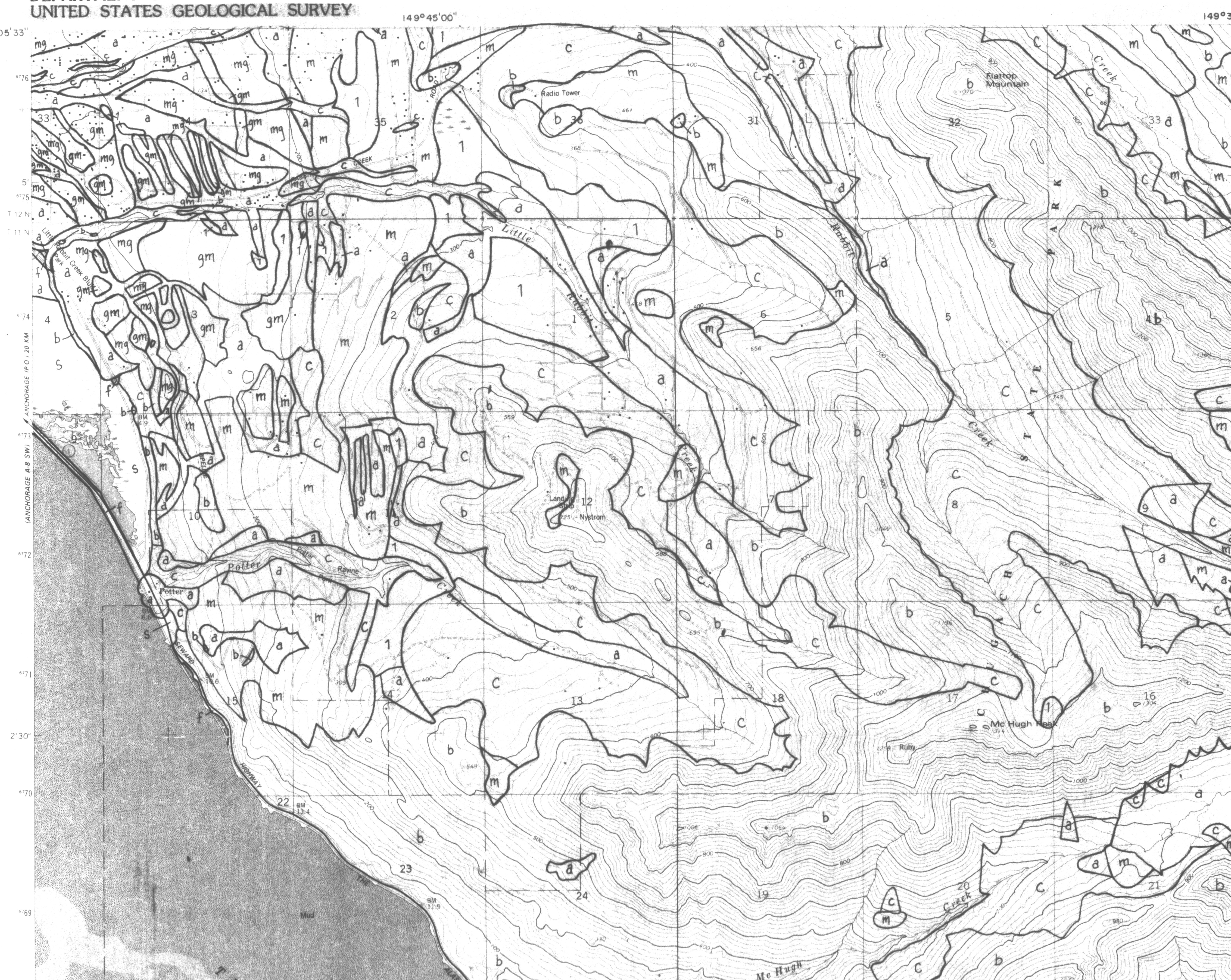
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

OPEN-FILE REPORT
81-1168



Base from U.S. Geological Survey, Anchorage (A-8) SE, 1:25,000, 1979.

SCALE 1:25,000

1 0.5 0 1 KILOMETER

1 0.5 0 1 MILE

CONTOUR INTERVAL 20 METERS

Geology generalized by R. P. Emanuel from unpublished mapping by H. R. Schmoll and Ernest Dobrovolny and in part from Schmoll and Dobrovolny (1972).

INDEX MAP SHOWING LOCATION OF STUDY AREA

NOTE: All units, except bedrock, are Quaternary in age.

a ALLUVIUM--Chiefly sand and gravel, well sorted and bedded; may contain interbedded silt and clay, as well as lenses of more heterogeneous sediments. Includes deposits of modern and ancient (mainly glacial) streams; alluvial fan and cone deposits; emerged delta deposits; and ice-contact glacial deposits in kames and kame terraces. Stream deposits form low terraces parallel to modern streams, and generally below 300 m in elevation. Alluvial fans and cones have greater relief, commonly at higher elevations. Distribution widespread, particularly near lower reaches of major modern streams. Low runoff, high permeability and rapid infiltration except where silt content is high. Includes the important aquifers in the area. Commonly saturated at depths below 3-6 m, especially along modern stream channels. Water-yielding capability fair to good. Yields may be 0.6-2 liters per second (L/s) or more where saturated thickness exceeds 3 m. Hydrogeologic characteristics related to onsite waste disposal include moderate to high percolation rates, which locally may be too rapid for adequate attenuation of contaminants before they reach ground water

m MORAINAL DEPOSITS--Intermixed gravel, sand, silt, and clay (till) deposited directly by glacial ice; lenses of moderately sorted sand and gravel present locally, and may grade into glacial alluvium. Consists generally of elongated hills, ridges, or slopes, usually smooth; includes some rounded mounds. Distribution mostly within a wide belt parallel to the mountain front at 200-300 m elevation. Scattered remnants of older moraines at higher elevations. Runoff low to moderate, even where slopes are steep; permeability and infiltration rates moderate. Where compacted or containing considerable clay, permeability may be low and infiltration may be slow, causing water to collect in depressions. Usually unsaturated, except at depth in deposits greater than 15 m thick. During wet seasons, perched water may exist at shallower depths. Water-yielding capability usually poor to fair because of low or moderate permeability; may be good where saturated lenses of sand and gravel present. Yields of 0.3-1.3 L/s have been obtained from such lenses. Hydrogeologic characteristics related to onsite waste disposal include percolation rates that generally provide for adequate attenuation of pollutants, although silty or clayey horizons may cause percolating liquids to perch at shallow depths, possibly contaminating local water supplies

gm GLACIAL AND (OR) MORAINE DEPOSITS--Intermixed deposits of gravel sand, silt, and clay, with some beds of fine sand and silt, and locally, sand and gravel. Chiefly glacial till that has been partly reworked during marine inundation and (or) buried by marine deposition. May grade into unmodified morainal or marine deposits. Consists of narrow parallel ridges having low relief, usually trending northwest. Distribution generally restricted to elevations below 200 m, near lower Rabbit Creek. Runoff commonly low; and infiltration and permeability rates moderate. Locally, high silt content or compaction cause lower permeability and infiltration. Generally unsaturated, except where silt beds at shallow depth have caused bogs to develop in depressions. Water-yielding capability generally poor. Deposits either unsaturated or too thin to yield significant quantities of water. Hydrogeologic characteristics generally unfavorable for onsite waste disposal. Percolation rates fair to poor; poor where high silt content or compaction reduces permeability causing inadequate infiltration of effluent and possibly return of effluent to land surface

mg MARINE-GLACIAL DEPOSITS--Interbedded fine sand, silt, and clay, with some beds of gravelly silt and some mixed gravel, sand, silt, and clay. Glacial till that has been extensively reworked by marine inundation and (or) buried by proglacial marine deposits that generally grade into unmodified or less modified glacial and marine deposits. Mainly broad smooth to slightly hummocky plains with nearly uniform slope. Distribution generally restricted to elevations below 200 m near lower Rabbit Creek. Runoff moderate although drainage patterns are poorly developed. Infiltration and permeability rates range from low to moderate; may be high locally in sandy material. Saturated only along most drainages. Water-yielding capability poor because of low to moderate permeability; also because deposits are too thin to yield significant amounts. Hydrogeologic characteristics related to onsite waste disposal generally consist of fair percolation rates and fair suitability, except where high silt or clay content cause lower permeability, rendering percolation rates inadequate

s TIDAL DEPOSITS--Silt and very fine sand deposited by tidal waters; may contain clay. Includes sediments in the tidal zone and in adjacent areas no longer, or only rarely, covered by tidal water. Mainly flat marshy plains. Distribution adjacent to Cook Inlet, primarily Potter Marsh. Runoff directly into Cook Inlet. Deposits of the tidal zone dissected by shallow drainage channels that tend to shift laterally because of continued tidal erosion and deposition. Infiltration and permeability extremely low. Generally saturated near surface. Tidal zone periodically submerged. Area unsuitable for general construction

l LAKE DEPOSITS--Silt and clay deposits with some beds of fine sand or sand and gravel, deposited in glacially dammed lake . Smooth, gentle slopes of former lake bottoms; dissected locally by modern streams. Distribution along stream valleys or at the head of minor drainages; primarily at elevations above 200 m. Runoff high and infiltration low because of low permeability. Springs may occur along upslope contacts with alluvium or slope deposits. May be saturated at or near the surface; water may collect at the surface because of low infiltration and permeability. Water-yielding capability poor. However, excavations usually fill with water due to slow seepage of water from near-surface sediments. Percolation rates very slow. Unless these deposits are penetrated, liquid wastes tend to collect at the surface

c SLOPE DEPOSITS--Colluvium and landslide deposits Mixed deposits of bedrock fragments and reworked glacial drift; includes some well to poorly sorted sand and gravel, and some unreworked glacial drift. Generally smoothly sloping talus fans and cones near steep bedrock exposures, merging into smooth valley deposits that are extensive in some places. Steeply sloping deposits on bluffs along major stream valleys. Distribution common on steep hillsides and in valleys above 400 m and along steep valley walls at lower elevations. Thin deposits of colluvium are common downslope from bedrock outcrops. Runoff low except where deposit is compacted; infiltration and permeability high, allowing rapid downward flow. At high altitudes, these deposits are important sources of recharge to area aquifers. Typically unsaturated, except briefly after heavy rains, because of rapid drainage and downward movement of infiltrating water. Water-yielding capabilities poor. Usually too thin and sporadically saturated to provide reliable supply of water. Hydrogeologic characteristics related to onsite waste disposal generally unfavorable. Percolation rates are rapid and may not permit adequate attenuation of onsite waste before it reaches ground water

f MANMADE FILL--Chiefly gravel and sand, but may include some silt and clay, and commonly bordered by riprap (boulder-sized rock fragments). Primarily fill for roadbeds and railroad embankments. Mapped only where unusually extensive fills have been emplaced. Topographic expression consists of linear banks, often steepsided and as much as 10 m high. Some fill underlies virtually all roadbeds and railroad tracks; deposits extensive only along major roadways and railway embankments where they cross streambeds, incised valleys, and tidal flats. Emplacements are too small to have significant impact on drainage or recharge except locally; culverts prevent uphill ponding of water when properly built. Erosion of embankments, especially those with high clay or silt content, may add considerable sediment to water downstream. Infiltration and permeability high. Water content unsaturated. Area unusable for further construction

b BEDROCK--Metamorphic rocks, primarily of McHugh Complex of Late Jurassic and (or) Cretaceous age, composed of metamorphosed siltstone, graywacke, arkose, and conglomeratic sandstone, and of greenstone associated with chert and argillite; near mouth of Little Rabbit Creek rocks of another complex include marble greenstone, and cherty argillite (Clark, 1972). Mantle of colluvium or morainal deposits may cover bedrock locally. Boundary between bedrock and adjacent deposits is commonly a broad area of transition only approximated by contact on map. Steepsided mountain ridges and knobs. Bedrock exposed on steep slopes and ridge crests over large areas in eastern and southern part of area, particularly above 400 m and in smaller outcrops along steep slopes and ridges at lower elevations throughout area. Runoff high where bedrock exposed. Permeability and infiltration very low, except where bedrock is fractured or weathered. Unweathered bedrock has low porosity and low water content even when saturated. Where bedrock is fractured and (or) weathered, water content is higher but rarely very significant. Water-yielding capability generally poor. Yields of 0.05-0.3 L/s are obtainable from some weathered or fractured zones. Rare zones of highly fractured rock may yield 0.6 L/s or more. Limited quantities of ground water may be available at bedrock-colluvium interface. Hydrogeologic characteristics unfavorable for onsite waste disposal. Contaminants may travel quickly and far through fractures to reach wells or surface-water bodies that intersect them

REFERENCES

Clark, S. H. B., 1972, Reconnaissance bedrock geologic map of the Chugach Mountains near Anchorage, Alaska: U.S. Geological Survey Miscellaneous Field Studies Map MF-350, scale 1:250,000.

Schmoll, H. R., and Dobrovolny, Ernest, 1972, Generalized geologic map of Anchorage and vicinity, Alaska: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-787-A, scale 1:24,000.

GENERALIZED GEOLOGIC MAP AND HYDROLOGIC PROPERTIES OF POTTER CREEK AREA, MUNICIPALITY OF ANCHORAGE, ALASKA

By
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1981